Minefile Through W. Hebberg
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State of Utah
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

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August 2, 1989

Mr. Frank D. Wicks, General Manager
Barrick Mercur Gold Mine
P.O. Box 838
Tooele, UT 84074

Re: Barrick June 9, 1989 Report on Tailings Pond Seepage, and Request for Remedial Investigation and Ground Water Monitoring Plan.

We have reviewed the above referenced report and evaluated water quality analyses and field observations collected by the Bureau on May 2, 1988, and have made the following findings:

FINDINGS

1. Utah Code Annotated 26-11-15 requires that:

   "Any person who spills or discharges any oil or other substance which may cause the pollution of the waters of the state shall immediately notify the executive secretary of the spill or discharge, any containment procedures undertaken, and a proposed procedure for cleanup and disposal, in accordance with rules of the committee."

2. The staff of the Utah Division of Oil, Gas and Mining (DOGM) responded to an anonymous citizen complaint on suspect leakage from the tailings pond (saddle dam) by contacting Barrick. Barrick subsequently notified the Bureau of Water Pollution Control of the leakage in a meeting of April 28, 1989.

3. In your submittal dated June 9, 1989 Barrick indicated that:

   a) Barrick first detected the tailings pond/saddle dam seepage approximately 600 ft south (downhill) of the saddle dam on approximately April 1, 1988.

   b) Barrick constructed a collection pipe for the tailings pond/saddle dam seepage to convey it to a lined catch pond on April 14, 1988.

   c) Barrick conducted sampling and monitoring of the tailings pond/saddle dam seepage from April, 1988 through April, 1989.

   d) On October 7 and 19, 1988 Barrick discovered two seeps approximately 1,500 and 2,000 ft south (downhill) from the saddle dam ("North" and "South" seeps in Manning Canyon). Barrick determined these flows to have similar characteristics as the saddle dam seepage.

e) In April, 1989 - Barrick discovered that the catch pond liner had failed, releasing the saddle dam seepage.

4. After review of information provided in Barrick's June 9, 1989 submittal and data collected during a May 2, 1989 Bureau field inspection, it has been determined that:

a. The saddle dam seepage emanates from a limestone unit referred to as the "medial limestone" of the Manning Canyon Shale, and is found at an elevation lower than the tailings pond. The strike of this rock unit runs beneath the tailings pond and saddle dam. This rock unit also appears to have a high hydraulic conductivity relative to other earth and rock materials found in the foundation of the tailings pond and saddle dam.

b. The seepage was first detected by Barrick before construction of the internal levee for the tailings pond, and the seepage was therefore not a direct result of the levee construction.

c. Water quality analyses from the tailings pond, and saddle dam ("medial limestone") seep all have a similar chemical signature, predominantly a sulfate type water indicating the tailings and/or reclaim pond are the sources of the seepage. This sulfate signature is contrary to the commonly expected bicarbonate signature of limestone aquifers.

d. Samples collected from the "medial limestone" seep by both Barrick and the Bureau, between September 14, 1988 and May 2, 1989 show a steady increase in total dissolved solids and sulfate content, another indication that the contamination source is the tailings and/or reclaim ponds.

e. Barrick's monitoring well TMW-2, located approximately 1000 ft northeast of the saddle dam seep, is completed in and screened across the "medial limestone". The well intercepts ground water whose average piezometric elevation is lower than the elevation of the saddle dam seep.

f. Information from the Utah State Engineer's Office shows the area in question is found in the recharge area for the principal drinking water supply aquifer in Cedar Valley, Utah County.

g. Water quality data provided by both Barrick (June 16, 1989 submittal) and the Bureau (May 2, 1989 sampling) show the water quality of the saddle dam seepage exceeds the following Utah Primary Drinking Water Standards (UAC R449-103-1):

Parameter	Saddle Dam Seep (mg/l)	Primary Drinking Water Standards (mg/l)
Cadmium	0.02	0.01
Lead	0.078	0.05
Nitrate as N	12.8	10
Selenium	0.028	0.01
Sulfate	1680	1000
Total Dissolved Solids	3352	2000

h. Cyanide (total) concentrations found both in the tailings pond and the saddle dam seep indicate the seepage is from the tailings pond.

i. Insufficient information is currently available to confirm that the Manning Canyon "North" and "South" seeps are a direct product of seepage from the tailings or reclaim ponds. However, the chemical signature of these waters is similar enough to warrant further study.

REQUEST

The above circumstances describe a situation which is of considerable concern to the State and we assume to your company. Unfortunately, there is not adequate system performance monitoring mechanisms or data to quantify the magnitude of these problems. Therefore, based on the above findings, the Executive Secretary requests that Barrick complete the following:

1. Submit within 60 days, a plan to conduct a remedial investigation, including hydrogeologic and other studies to characterize the ground water flow conditions in the vicinity of the tailings pond. Such studies should also evaluate the impact, pathway, fate and quantity of leachate lost from the tailings pond to ground water. Attention should be focused on an assessment of how much contaminant leachate passes out of Barrick's current detection and control. Submit with the plan, a detailed implementation schedule for completion of each phase of studies requested above. This information can be integrated into the work being done for leach pad No. 2. The results of the studies will be used to determine the appropriate containment or contaminant recapture system to control tailings pond leachates if necessary.

2. Submit within 30 days a plan to sample and monitor:

   a) Tailings Pond Monitoring Wells TMW-1 and 2
   b) "North" and "South" seeps in Manning Canyon
   c) Manning Spring
   d) Fairfield Springs

   This plan should include as a minimum measurements for the following parameters:

   Field Measurements:

   a) Surface sources:
      - pH
      - temperature
      - conductivity
      - approximate flow rate

   b) Well sources:
      - water level and volume of water column in well prior to pumping
      - pumping rate and volume purged before sample collection
      - pH, temperature, conductivity

Laboratory Analyses for All Water Sources:

a) Inorganics:

Sodium	Carbonate	Specific conductance
Potassium	Bicarbonate	Total dissolved solids
Calcium	Carbon dioxide	Ion balance
Magnesium	Hydroxide	pH
	Cloride	
	Sulfate	
	Nitrate	
	Ammonia	

b) Metals:

Arsenic	Copper	Mercury
Barium	Iron	Selenium
Cadmium	Lead	Silver
Chromium	Manganese	Zinc

c) Cyanide:

Total
Free
Weak-acid dissociable

The sampling and monitoring plan should also include quality assurance procedures for sampling, sample preservation, and sample analysis. Sampling frequency should be at least monthly for monitoring wells TMW-1 and 2 and the "North" and "South" seeps of Manning Canyon; and at least quarterly for Manning and Fairfield Springs.

We appreciate the cooperation you have shown on these matters to date. We will be available to meet with you to clarify the positions stated herein or to discuss any concerns you may have. If you have questions please contact Loren Morton at 538-6146.

Sincerely,

Utah Water Pollution Control Committee

Don A. Ostler, P.E.
Executive Secretary

Enclosures

LBM:kc
cc: Ken Alkema, Division of Env. Health
Fred Nelson, Asst. Attorney General
Glen Eurick, Barrick
Scott Matheson, Parsons, Behle & Latimer
Stephen Matern, Tooele County Health Dept.
Wayne Hedberg, DOGM
Glade Shelley, Utah County Health Dept.
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